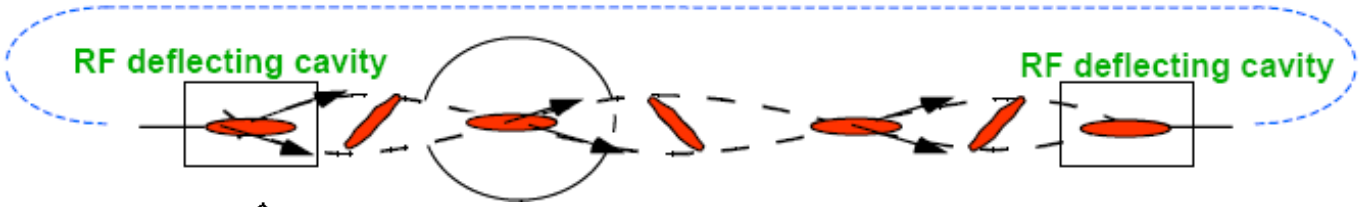
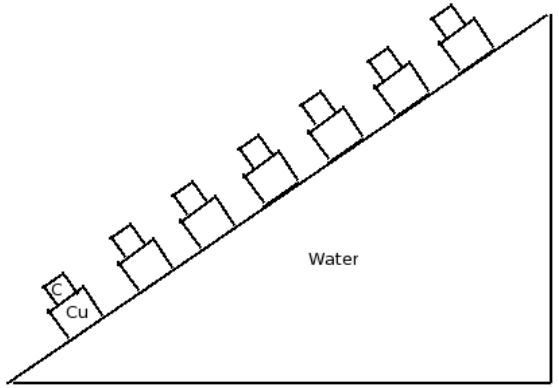
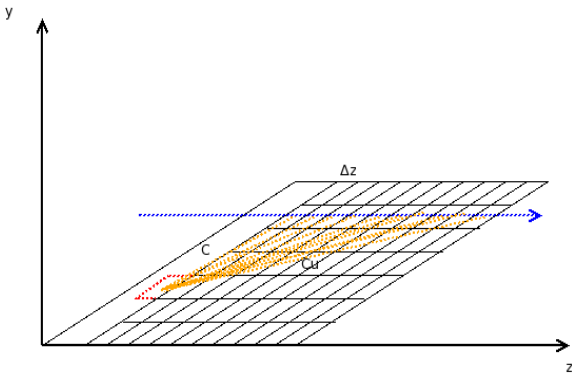
Simulation of Diamond Phase Detector

Shihao Tian
Supervised by : Bingxin Yang
July 15, 2011

Diamond Phase Detector

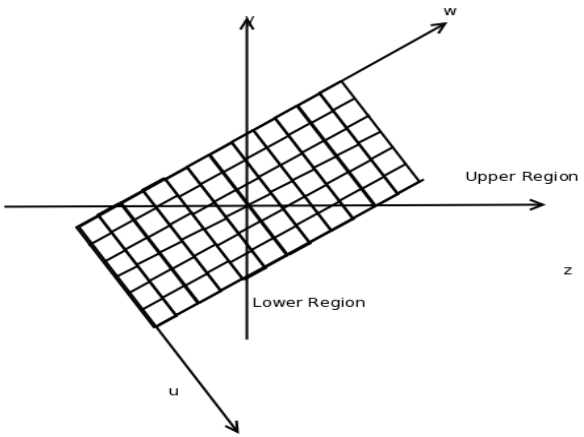






- Structure: 3 parts including diamond(detect), copper(support) and water(cool off)
- Function: detect the phase difference of the incoming X-ray
- Theory
  - First absorption by diamond
  - Second fluorescence by copper
- Simulation Process
  - Generate X-ray Spectra
  - Divide the whole area into small grids
  - Calculate the absorption of each grid
  - Generate intensity map as well as other diagrams

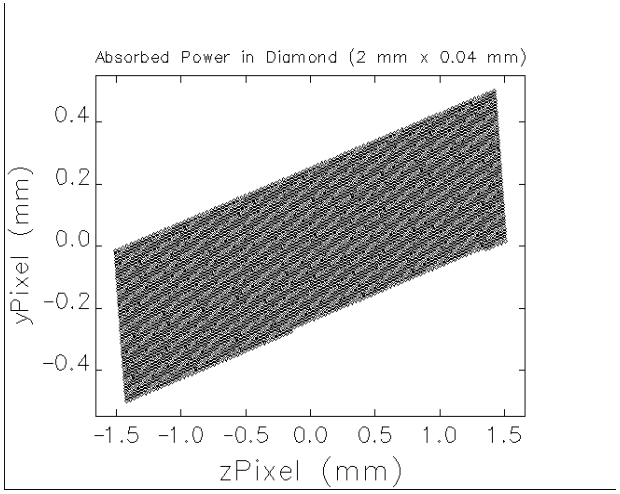
Current Progress (First Absorption)

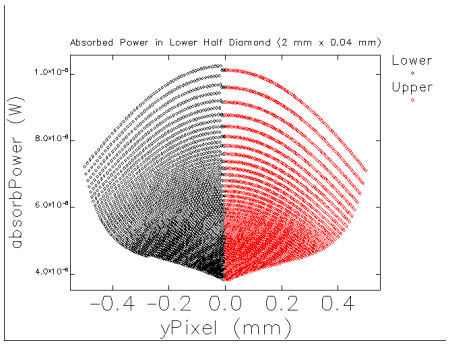


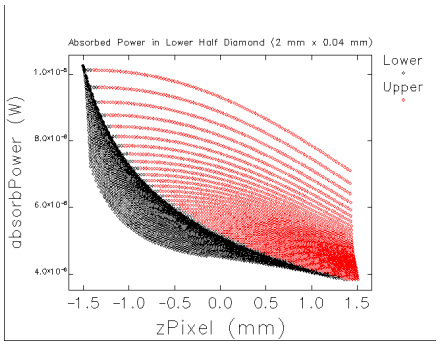
- Construct the model
  - Approximate the tilted line as up-right
  - Divide the whole area into two regions
- Calculate the first absorption

$$f_{abs} = I_{(\omega,\varphi)}(1 - e^{-\mu_C d_C / \sin\varphi_0})$$

- Write code in TCL
- Results







Future Work

- Debug the current program
- Develop the model for the secondary absorption due to the copper
- Develop the electron-hole transport in the detector
- Compare the results with experimental data